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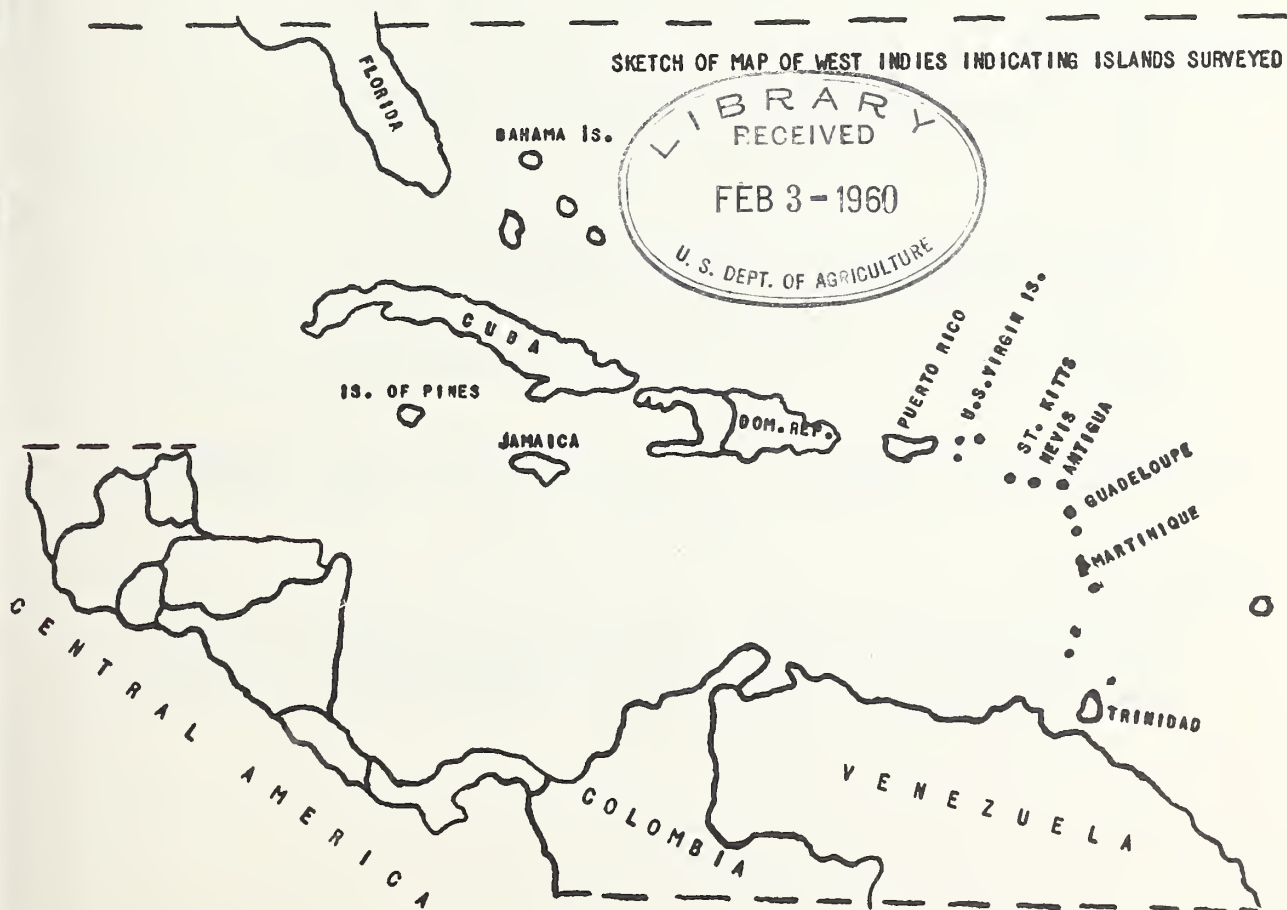
UNITED STATES DEPARTMENT OF AGRICULTURE
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SUMMARY RESULTS FOR MEDITERRANEAN FRUIT FLY
COOPERATIVE SURVEYS IN THE WEST INDIES IN 1956

By R. G. Oakley

Introduction

The need of further facts on distribution of the Mediterranean fruit fly (*Ceratitis capitata* (Wied.)) became of increased significance to the Plant Quarantine Division in 1956 coincident with the spread of that pest into Florida from an unknown source. That the insect had been brought to Florida in importations of fruits and vegetables from an unknown reservoir infestation in an island of the West Indies was a possibility that could not be overlooked, hence placing the Division in a position of having to establish presence or absence of the pest in those islands before it could properly administer importations from them. With objectives of developing such information and of aiding officials of Governments concerned in discovering any infestations of the fruit fly existing in their respective areas the Director arranged with appropriate Island authorities to conduct joint surveys



in representative islands known to be touched by international air traffic. At the same time plans went forward to survey Puerto Rico and the U. S. Virgin Islands with Division personnel. The following is a summary account of the program undertaken and results.

Islands Surveyed, Officials Consulted, Survey Itineraries,
and Personnel Participating

Jamaica

Survey agreement reference: Despatch No. 9 of August 15, 1956 from American Consul General, Kingston, indicating the Jamaican Ministry of Agriculture welcomed the survey.

Ranking Island official consulted in survey: Mr. William Sievwright, Minister of Agriculture.

Dates surveyed: September 16 to October 4, 1956.

Personnel participating: James E. Mabry, Jr. of the Division and Dr. H. C. James, Plant Protection official, Dr. A. L. Reid, Entomologist, and Mr. N. E. C. Thompson, Agriculturist, of the Jamaican Ministry of Agriculture.

Bahama Islands

Survey agreement reference: Despatch No. 8 of August 23, 1956 from the American Consulate, Nassau, conveying acceptance of survey proposal in behalf of Mr. O. S. Russell, Director of Agriculture.

Ranking Island official consulted in survey: Mr. O. S. Russell, Director of Agriculture.

Dates surveyed: New Providence Island only on October 8 to 26, 1956.

Personnel participating: James E. Mabry, Jr. of the Division with P. Michael, Sr. Agricultural Instructor, and R. Sands, Assistant Agricultural Instructor, of Nassau.

Trinidad, B.W.I.

Survey agreement reference: Despatch No. 44 of October 9, 1956 from the American Consulate, Port of Spain, indicating the Trinidad Ministry of Agriculture would welcome a survey team.

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Ranking Island official consulted in survey: Dr. Holeman B. Williams, Director of Agriculture.

Dates surveyed: November 1 to 20, 1956.

Personnel participating: James E. Mabry, Jr., together with Mr. Gordon Stell, Entomologist, and associates, Messrs. S. Bharath, I. Hosein, A. Rohman, and N. Khan of the Trinidad Ministry of Agriculture.

Cuba and Isle of Pines

Survey agreement reference: Telegram No. 139 of September 17, 1956 from American Embassy, Havana, indicating formal acceptance of survey assistance was in process of preparation by Cuban Ministry of Agriculture.

Ranking Island official consulted in survey: Sr. Fidel Barreto Martinez, Ministro de Agricultura.

Dates surveyed: For Cuba - September 27 to November 5, 1956; for Isle of Pines - October 24 to November 2, 1956.

Personnel participating: For Cuba - Jose Hidalgo, Jr. of New York and Ing. Antonio Martinez Andreu and Srs. Antonio Tellez Perez, Alfredo C. Petinoud, L. Martinez, Ortiz, and Gustavo Ramon of the Cuban Ministry of Agriculture. For Isle of Pines - Dean C. Hamilton of New Orleans, assisted by Sr. Oscar Hernandez Torres of that island.

Dominican Republic

Survey agreement reference: Despatch No. 25 of August 22, 1956 from J. E. Montel, Agricultural Attache, Ciudad Trujillo, quoting a communication of August 21 addressed to the American Embassy from the Secretariat of State for Foreign Affairs and Worship indicating Secretary of Agriculture, Luis R. Mercado, accepts offer of survey assistance with pleasure.

Ranking Island official consulted in survey: Lic. Luis R. Mercado, Ministro de Agricultura.

Dates surveyed: October 1 to 22, 1956

Personnel participating: Dean C. Hamilton of New Orleans, together with Drs. Miguel Cestero and M. A. Gimberg, Chief Plant Quarantine Inspector and Entomologist, respectively, of the Dominican Republic Ministry of Agriculture.

Guadeloupe and Martinique, F.W.I.

Survey agreement reference: Despatch No. 22 of October 26, 1956 from American Consulate, Fort de France, Martinique, indicating Mr. Hubert Guyot, Director, Institut des Fruits et Agrumes Colonia (IFAC), Guadeloupe, and Mr. Blanche, Agricultural Service, Martinique, accepted the opportunity for a Mediterranean fruit fly survey of those two islands.

Ranking Island official consulted in survey: Mr. Hubert Guyot, Director of "IFAC", Guadeloupe, and Mr. Blanche, Agricultural Service, Martinique.

Dates surveyed: For Guadeloupe - November 13-22, 1956; for Martinique - November 24 to December 6, 1956.

Personnel participating: Dean C. Hamilton, together with Mr. Hubert Guyot of "IFAC" and Messrs. Pierre Estanove and Lemaire Yves of Centre Technique de La Canne et Ju Sucre on Guadeloupe and Messrs. Michel Barbier and Pierre Olivier of "IFAC" on Martinique.

Antigua, B.W.I.

Survey agreement reference: Letter of October 15, 1956 from Mr. O. G. Williams, Assistant Agricultural and Food Attache, British Embassy, Washington, D.C., indicating the Governor of the Leeward Islands had granted permission to conduct a survey in Antigua.

Ranking Island official consulted in survey: Mr. Malcolm Park, Director of Agriculture.

Dates surveyed: November 15 to 17 and 21 to 30, 1956.

Personnel participating: John L. Ward of Houston, together with Mr. Malcolm Park, Director of Agriculture, and Mr. R. A. Baynes, Agricultural Assistant of Antigua.

St. Kitts and Nevis, B.W.I.

Survey agreement reference: Despatch No. 29 of October 9, 1956 from American Consulate, Barbados, indicating subadministrators office at St. Kitts would welcome assistance in Mediterranean fruit fly survey.

Ranking Island official consulted in survey: Mr. R. E. Kelsick, Superintendent of Agriculture, St. Kitts; and Mr. G. L. Bellot, Superintendent of Agriculture, Nevis.

Dates surveyed: St. Kitts on November 2-8, 10-11, 13-14, 18 and 20, 1956; Nevis on November 9, 12, and 19, 1956.

Personnel participating: John L. Ward of Houston, together with Mr. Philip Evelyn, Agricultural Assistant, in St. Kitts and Mr. Robert Clifton, Cotton Inspector, in Nevis.

Puerto Rico

Dates surveyed: Beginning September 10 and continuing through December.

Personnel participating: H. K. Plank, assisted by other Division and Commonwealth inspectors.

Virgin Islands (U.S.)

Dates surveyed: Beginning September 10 and continuing through December.

Personnel participating: Ramon C. Delgado.

InterAgency Cooperative Assistance

Solicitations of invitations to conduct surveys were conducted by Mr. A. Clinton Cook, Chief, Commodity and Analysis Branch, Fruit and Vegetable Division, Foreign Agricultural Service. His excellent representation was aided by the following: For Cuba - Mr. Chester Davis, Agricultural Attache; for the Dominican Republic - Mr. J. Montel, Agricultural Attache; for Jamaica, Bahamas, Trinidad and Martinique - by the respective consular officials of those islands; for St. Kitts and Nevis - by the consular official of Barbados; and for Antigua - by a British Embassy representative in Washington. Respective consular officials in the several islands also supplied most helpful assistance in relations with Island Government officials in connection with the actual surveys. Valuable cooperation was also supplied in survey operations around Naval Bases in Guantanamo Bay, Antigua, and Trinidad by U. S. Naval personnel.

Island Government Relations

The initial step on arrival in every island by a Division survey participant consisted of visiting the State Department office at the capital city which led to introductory meetings with Agricultural officials of governments concerned and eventual completion of survey arrangements. Relations with Island government officials during the surveys were most cordial throughout. Cooperation was also at a high level of effectiveness although there was evidence that good relations work by the visiting survey specialists contributed to increased efficiency of operations. Both transportation facilities and personnel assistance were readily provided in each island without expense to the Division except for gasoline in the case of the Isle of Pines.

In the French Islands of Guadeloupe and Martinique all cooperative work was performed with a semi-official government agency, commonly referred to as "IFAC" (Institut des Fruits et Agrumes Coloniaux). Relations in both islands were most satisfying, even though the Division representative was unable to speak French and met few people who could speak English.

A close working relationship was apparently developed by the Division representatives among their respective foreign field associates, as was illustrated by the fact that information on plant quarantine protection facilities in the islands came to them unsolicited. This information was of value to them in estimating prospects of entry of the Mediterranean fruit fly.

Provision for Survey Equipment

Supplies for the surveys (traps and bait) were furnished by the Plant Pest Control Division from Florida which agency shipped them direct in the case of Cuba, Jamaica, Dominican Republic and Puerto Rico in advance of anticipated arrival dates of the survey participants. For surveys in the other islands, the team members took along the supplies as excess baggage to assure the equipment would be on hand when needed. This last arrangement proved to be most advantageous and relatively inexpensive, considering the traps weighed approximately 7 ounces each.

Survey Procedure

Survey methods employed in the islands consisted largely of the operation of plastic traps baited with poisoned oil of angelica seed to attract males of the Mediterranean fruit fly which method of detection was developed by fruit fly specialists of the Entomology Research Division. Trapping procedure was supplemented when occasion permitted, however, by the examination of fresh fruit, including that found in the field and purchased in local markets, for the presence of larvae of the fruit fly. The holding of fruit in rearing was also practiced in a few cases.

Trapping Procedure in Foreign Islands

The placing of traps in the field was preceded in each island by consultations with local officials and examination of available maps to ascertain preferable locations for trap installations. Once a general plan of operation was established so as to cover accessible sections of all fruit growing districts of the islands under survey, traps were then placed in host fruit trees (if available) of the fruit fly in locations in order of preference, as follows: (1) In vicinities of international airports; (2) in residential areas surrounding seaports, principal towns,

and tourist centers; (3) in wild guava plantings; (4) in commercial fruit orchards; (5) in roadside fruit trees at intervals along highways; and (6) in residential properties of more outlying towns. Traps were generally placed about 300-400 yards apart on this plan for Nos. 1 to 4 if suitable locations were encountered. In case of Nos. 5 and 6, however, distance intervals between traps were much greater.

Traps having been placed in desirable locations were inspected at approximately weekly intervals, then either recharged with bait and relocated or else collected and packed for reshipment, the action taken depending on size of the island under survey and number of traps available. The trap supply was inadequate to obtain coverage in case of large islands, hence relocation of traps was necessary in such islands. For small islands, one setting of available traps was generally sufficient to obtain desired coverage.

Localities Trapped by Island

Jamaica. 142 traps were used in Jamaica, 82 of which were transferred to other localities one week after they were initially placed in the field. Localities and trap locations were as follows:

<u>Locality</u>	<u>No. trap locations</u>
Palisades Airport	5
Kingston City properties	50
Hope Gardens	7
Kingston-Ewarton Rd. (6.prop.)	21
Montego Bay Area	70
(Airport-4; City properties-26; and rural estates and misc.-40)	
Chapelton - Trout Hill Area	40
(Rock River, Lower Ground Lower Chapelton, Pennant Rd., Trout Hall)	
Kingston - Annatto Bay Road	37
(Golden Spring, Temple Hall, Toms' River Castleton, Annatto Bay Highgate, Ranch, Lewis Store)	

Bahamas. The survey in this island group included only New Providence Island in view of information furnished by the Director of Agriculture indicating the other islands were quite barren of fruit fly hosts and that there were no significant communications direct from foreign countries with such islands. 122 traps were used in New Providence, in accordance with the following plan:

<u>Locality</u>	<u>No. trap locations</u>
Nassau City	71
Agricultural Experiment Station	5
Yamacraw Hill Road	3
Prison Farm	15
Old Fort	5
Prospect Ridge	9
Adastra Gardens (2), Cable Beach (2),	
Deliport (1), Gambier Village (3)	
Lyford Cay (1), Adelaide Road (2)	
Carmichael - Gladstone Road (1)	
Carmichael - Bluehill Road (1), Bluehill	
Harold Rd (2), RAF Cemetery vic.	18
Bohamiam Industries	10
Skyline Drive Heights	10
Industrial School	10
Hog Island	3

Trinidad.* 160 fruit fly traps were set in the island at the outset of the survey, 69 of which were later relocated to make a total of 229 locations trapped, as indicated below:

<u>Locality</u>	<u>No. trap locations</u>
Piarco Airport & Oropune Village	17
Straten Lodge and St. Augustine	
Circular Road	41
Western Main Road	14
Piarco Airport to Port of Spain	11
San Juan - Santa Cruz - Saddle Road	34
Imperial College of Tr. Agr.	24
Port of Spain - Residential area	44
U. S. Naval Base area	43

*Tentative original plans to include nearby Tobago Island in the survey were abandoned after it was learned in Trinidad that Tobago receives no traffic direct from foreign countries.

Cuba. Trapping activities in Cuba were concentrated to some extent on major roads in the Provinces of Havana and Camaguey but were generally extended otherwise in localities along a central highway leading east from San Juan and Pinar Del Rio near the Western end of the island, through Havana, Matanzas, Colon, Santa Clara, Camaguey, and Holguin to Manzanillo and Santiago de Cuba near the eastern end of the island. Guantanamo on the east, Sagua la Grande in the north central section, and Cienfuegos and Trinidad in the south central section were also included in 50 localities trapped in the six Cuban provinces with 600 traps used collectively in 1,150 locations, as summarized below:

<u>Province</u>	<u>No. localities</u>	<u>No. trap locations</u>
Pinar del Rio	11	105
Havana	20	300
Matanzas	4	56
Las Villas	4	179
Camaguey	7	220
Oriente	4	135

Isle of Pines. 140 fruit fly traps were placed in commercial groves in localities of Santa Barbara, Sante Fe, Colombia, McKinley, and Las Indios, together with a few in residential areas of Nueva Gerona.

Dominican Republic. Observations were made in 221 locations in residential areas of towns and villages and along highways, using 175 traps as follows:

<u>Locality</u>	<u>No. trap locations</u>
Ciudad Trujillo Vicinity	36
Ciudad Trujillo and airport	21
San Cristobal, Nigua, and Bani	66
San Pedro de Macoris	5
La Romana	18
La Vega	9
Moca	4
Santiago	15
Puerto Plata	10
La Corda	10
Julia Moliva	7
Sanchez	20

Guadeloupe. A total of 294 traps were set on the island, generally around the coastal area, as follows:

<u>Locality</u>	<u>No. trap locations</u>
Pointe-a-Pitre and airport	100
Grande-Terre Is. (Grippeon, Maule, St. Anne, Les Abymer, Blanchet, Petit Canal, and Toujours-Toi	75
Guadeloupe (north, east, south and southwest coasts, including Basse - Terre, St. Claude, and inland from St. Marie to the mountains)	119

Martinique. 297 traps were set in towns and villages and along highways as follows:

<u>Locality</u>	<u>No. trap locations</u>
Fort de France	120
Lamentin and airport	25
Highway from airport to Fort de France	50
Francois Vauclen, St. Esprit, Petit Bourg, St. Joseph, Trinite, St. Marie, Marigot, Macauba, Ajoupa Bouillon, and Morne Rouge	97

Antigua. 165 traps were dispersed among scattered fruit plantings in localities according to the following:

<u>Locality</u>	<u>No. trap locations</u>
Antigua Beach Hotel	8
Airport vicinity	21
St. Johns and Harbor area	36
Golden Grove & Jennings	2
Belands	2
Green Castle	7
All Saints and Sweets Village	12
Miscellaneous Localities (31)	77

St. Kitts. 103 fruit fly traps were used on this island in 103 locations as follows:

<u>Locality</u>	<u>No. trap locations</u>
Basseterre (harbor & airport area)	40
Camjon Village vicinity	12
Bayfords vicinity	9
Brighton's Estate	4
Ottley's Village	4
Miscellaneous sites (23)	34

Nevis. 84 fruit fly traps were distributed mostly in dooryard fruit plantings in the localities listed below:

<u>Locality</u>	<u>No. trap locations</u>
Charleston harbor area	14
Croddock Road	8
Government Road	6
Jessups	8
Cotton Ground	4
Miscellaneous Sites (29)	44

Trapping Procedure in Puerto Rico and Virgin Islands

For these islands baited traps were placed in host fruit trees at intervals around airports and maritime ports of entry at the outset of the survey. They were inspected on a weekly basis, recharged with bait, and relocated in other trees generally. Some traps, however, were kept in original locations if no favorable alternate sites were available in the vicinities being surveyed. General distribution and operation of the traps was as follows:

	<u>Locality</u>	<u>No. traps</u>
Puerto Rico -	Arecibo	20
	Ramey Air Force	20
	Mayaguez	20
	Ponce	20
	Fajardo	20
	International Airport	20
	San Juan vicinity	20
Virgin Islands -	St. Thomas	20
	St. Croix	20
	St. John	10

RESULTS OF THE SURVEYS

Fruit Fly Findings

Surveys in all the Islands yielded negative findings for the Mediterranean fruit fly. Occasional adults of West Indian fruit flies (Anastrepha mombinpraeoptans Sein and A. suspensa (Loew)) were encountered in Jamaica, Cuba, and Puerto Rico, a few of them being attracted to traps. Only A. mombinpraeoptans was observed in the Dominican Republic (A. suspensa is also recorded there), U. S. Virgin Islands, Antigua, St. Kitts, Nevis, Guadeloupe, and Martinique. Several species of the Anastrepha group were seen in Trinidad from which place, however, no complete identifications were received. No evidence of fruit flies, either in traps or in host fruits examined, was observed in the Bahama Islands which finding corresponds to absence of literature records associating fruit flies with that island group.

General Topography and Fruit Fly Host Conditions in Islands Surveyed

Jamaica. The generally rough topography of Jamaica includes an undeveloped mountainous section comprising more than half the island's entire land

area. Fringes of this section were noted to contain preferred fruit fly hosts of wild guava and roseapple, so it was assumed that the same applied to much of the unobserved portions. The inhabited area was rich in fruit fly host flora, about 55 varieties of which were observed, collectively, in estates, commercial acreages, and dooryard or roadside plantings. These included Citrus spp. (oranges, grapefruit, tangerines, Ugli fruit, etc.) in commercial orchards of about 9,800 acres in addition to thousands of trees in dooryards; also star-apple, mango, guava, tropical almond, coffee, avocado, Spondias spp., and roseapple in abundance. The enumerated hosts, together with the other species in lesser abundance, appeared to offer a favorable sequence of ripe fruits throughout most of a year and on which the fruit fly, if introduced, could probably thrive. Other crops noted were many commercial plantings of pineapples, bananas, sugarcane, vegetables, and more miscellaneous roots crops, etc..

Bahama Islands. Approximately two-thirds of New Providence Island on which the city of Nassau is situated, was noted to consist of pine and scrub brush lands. The same was likewise observed in a section of Andros Island visited. The inhabited section of New Providence, or a flat area of coral soil formation, was found to have little commercial fruit production acreage, yet had about 40 species of fruitfly host plants of which the sapote, guava, star-apple, Chrysophyllum oliviforme, and Spondias spp. were the most abundant. Other more common hosts in dooryard plantings were citrus, Governor's plum, Surinam cherry, Barbados cherry, avocado, natal plum, tropical almond, mango, Annonas, and Lucuma nervosa. The conclusion was reached from observations and information supplied by local residents that the fruiting season from these hosts was not prolonged over a long period of a year, thus possibly accounting for the apparent absence of West Indian fruit flies from the island. This suggests that the Mediterranean fruit fly might not survive in the Bahamas, even if introduced at a favorable time.

Trinidad. Cities, villages, rural properties and cultivated acreage occupy a large part of the island. Its favorable rainfall and other growing conditions contribute to lush growing flora that includes about 70 species of known fruit fly host plants. Cultivated lands were devoted to production of sugarcane, bananas, a variety of field and vegetable crops, and possibly 1,500 acres of commercial citrus acreage. Other fruits were largely in dooryard, roadside, or wild plantings of which the most abundant were the following: Mango, avocado, Barbados cherry, beach plum, Cacao, Spondias, Governor's plum, guava, Java plum, loquat, papaya, mamey apple, passion fruit, pomegranate, Surinam cherry, sapodillo, star-apple, Annonas, and tropical almonds. Collectively, these and other hosts apparently yield a continuing fruit sequence on which the Mediterranean fruit fly could be expected to thrive, if introduced.

Cuba. This island, some 600 miles in length, has a variety of landscape patterns, including mountainous areas where coffee is produced, plains and rolling country with large acreages of grazing lands, sugarcane,

pineapples, and a variety of other field and horticultural crops, including considerable acreage in vegetables from which exports are made to the United States. The Western half of the island is more heavily populated, consequently a greater variety of fruit fly hosts is to be seen there. As in other islands of the West Indies a majority of these occur in the form of dooryard, roadside, or wild plantings, although occasional commercial sized groves of citrus, avocados, and mangoes are present in some of the provinces, especially in Havana Province. About 100 fruit fly host plants are recorded for Cuba of which the more commonly encountered were mango, citrus (grapefruit, oranges, tangerines, etc.), guava (very common, even in large acreages), avocado, sapote, tropical almond, star-apple, Hicaco plum, loquat, Spondias, Annona spp., papaya, canistel, mamey apple, and sapodilla. Some of these fruit trees, together with a few other less common ones making a total of 19 species said to be in fruit more or less throughout all seasons a year, contribute to a favorable host sequence for the Mediterranean fruit fly should it be introduced.

Isle of Pines. About two thirds of this small island off the south coast of Cuba is inhabited while the other third is marshy. The inhabited area is covered with pine trees and palms, except for dotted acreage of citrus groves and vegetables from which exports reach the United States. Aside from citrus, fruit fly hosts are few and include scattered mango, avocado, and a few miscellaneous fruit trees in dooryard plantings. Conditions did not appear very favorable for the maintenance of a very destructive population of fruit flies.

Dominican Republic. The central or mountainous section of the Republic contains considerable coffee acreage dotted with occasional villages and small farms. The southern coastal and adjacent areas are more heavily populated, consequently contain a greater variety of tropical fruits, including some commercial citrus groves. The eastern end of the island is arid and includes large acreages of sugarcane bordered with brush lands, neither area of which offers favorable habitats for fruit flies. Of some 60-75 hosts to be seen collectively in the northern and southern areas, citrus, coffee, mango, and guava are the most common, with avocado, Spondias, roseapple, tropical almond, mamey apple, and Annona spp. present next in order of abundance. These produce a host sequence favorable to maintenance of a large fruit fly population.

Puerto Rico. This island, with its somewhat favorable rainfall distribution, except for the southern coastal area, appears to offer ideal conditions for the Mediterranean fruit fly if introduced. Commercial grapefruit groves near the northern coast, dooryard citrus generally common in the smaller villages, heavy orange production in the mountainous coffee area, and a variety of other tropical fruits, such as mango and guava in abundance, together with roseapple, star-apple, and Spondias varieties, yield host fruits in plenty. Great quantities of ripe fruit are thus available in many localities during the first nine months of a year.

Virgin Islands. Relatively light rainfall in these islands of generally rough terrain limits fruit production largely to summer months, hence reflecting on prospective fruit fly populations in a like manner. Mangoes and guavas are present in fairly large numbers in St. Croix and to a lesser extent on St. Thomas but other than these, considerable cactus, occasional citrus in dooryard plantings, and some tropical almond shade trees on roadsides represent the more significant fruit fly host potential. Relatively small populations of the West Indian fruit fly (Anastrepha mombinpraeoptans Sein) noted in the Virgin Islands and the apparent absence of a related fruit fly species (A. suspensa (Lw.)) which occurs in nearby Puerto Rico, suggest that the Mediterranean fruit fly might not become too destructive if introduced:

Antigua. The northern part of the island is of coral formation while the hilly southern part consists of eroded remnants of extinct volcanoes. The island in general is rather flat and dry although possessing an arid section where cotton is grown as well as a so-called humid section where sugarcane is the chief crop. Except in dooryard plantings no fruit fly hosts were seen in the arid section. In the more humid section, however, the mango, guava, Spondias spp., citrus, barbados cherry, sapodilla, and avocado flourish, but are mainly limited to estate, dooryard, and roadside plantings for non-commercial purposes. It appeared that fruit from these plantings could sustain populations of the fruit fly throughout a year if introduced.

St. Kitts. Practically all of the arable land in this island of mountainous terrain is used for sugarcane and cotton production. While fruit fly host fruits are not grown on a sizeable commercial scale, a variety of them, nevertheless, are to be seen; collectively, in estates, mountain ravines, dooryards, and along roadsides. The group observed consisted chiefly of citrus, mango, guava, Spondias, barbados cherry, sapodilla, and avocado, as were listed above for Antigua. Potential production of fruit trees encountered and the apparent sequence of maturity of fruit from such trees suggested that destructive populations of the fruit fly, if introduced, might develop.

Nevis. Conditions on Nevis are basically similar to those of St. Kitts except that it has less fertile soil. Its chief agricultural crops are cotton and coconuts. Fruit crops consist of dooryard plantings of kinds common to Antigua and St. Kitts.

Guadeloupe. The Guadeloupe administration in reality covers the two islands of Grande-Terre and Guadeloupe. The first of these is flat and somewhat arid with brush covered hills surrounded by sugarcane fields. Pointe-a-Pitre, the seat of administration, and the international airport are on this island. Only scattering fruit fly hosts including oranges, mangoes, and jujube, were observed. The island of Guadeloupe is mountainous, the interior being forested and almost uninhabited although a few small citrus groves occur there. The generally populated area around the coast has sugarcane and banana plantings, but few fruit fly hosts except occasional mangoes and guavas and two small commercial citrus

groves of oranges and grapefruit. Conditions in general did not suggest the Mediterranean fruit fly, if introduced, would be greatly significant.

Public markets of Guadeloupe were noted to have apples, pears, onions, and garlic of European origin on sale.

Martinique. This island has an abundance of fruitfly hosts in its mountainous central section but few in the west and extreme mountainous northern region and none in an arid strip on the south. Bananas and pineapples represent principal crops in the northern section, along with some sugarcane and vegetables, while sugarcane is the chief crop in the central and southern sections. The central section was noted to have a variety of fruit fly host trees, most habitations having oranges, avocados, Spondias, mangoes, guavas, etc. in dooryard plantings collectively yielding ripe fruits during the major portion of a year and favorable to maintenance of destructive fruit fly populations.

Potatoes, onions, and garlic of European origin were observed in the public markets of Martinique.

Provision for Further Surveys

Interest on the part of island officials in conducting further surveys for the Mediterranean fruit fly at intervals was manifested in several of the islands. The Division in consequence, and in the interest of cooperative surveys, provided the agricultural departments of the following islands small quantities of fruit fly lure and with the number of traps indicated below upon completion of the surveys.

<u>Island</u>	<u>No. of traps left on island</u>
Jamaica	20
Bahama Islands	7
Trinidad	45
Dominican Republic	18
St. Kitts	7
Nevis	5
Antigua	10

Although no trap supplies were left in Cuba, enthusiastic interest in continuing the surveys on that island was manifested by Agricultural officials. In fact about 800 traps were procured by them for that purpose.

In Puerto Rico and the Virgin Islands trapping is being continued along a small scale around airports and maritime ports of entry. This program is scheduled to continue until late summer of 1957 if not longer.

Miscellaneous Insect Observations

Although survey team members were assigned to the islands primarily for Mediterranean fruit fly observations and only for which prior arrangements were made with governments concerned, they used opportunities available to them for making observations on other fruit and vegetable insects as well. In addition, examinations were made of the European fruits found on the public markets of Guadeloupe and Martinique. Findings of pests were negative in all respects except for those species previously known to occur in the islands.

Summary and Conclusions

Cooperative surveys for the Mediterranean fruit fly conducted in the Bahama Islands, Cuba and Isle of Pines, Jamaica, Dominican Republic, Antigua, B.W.I., St. Kitts and Nevis, B.W.I., Guadeloupe and Martinique, F.W.I., and Trinidad, B.W.I. during the fall months of 1956 by Island officials and Division representatives yielded negative findings for that pest. Results of simultaneous surveys conducted in Puerto Rico and the Virgin Islands by Division personnel with assistance in Puerto Rico by Commonwealth personnel, were also negative.

The islands surveyed, with the possible exception of the Bahamas, appeared to offer favorable conditions where the fruit fly would thrive if introduced, and, in the case of Cuba, Jamaica, Dominican Republic, Puerto Rico, Martinique, and Trinidad, perhaps become exceedingly destructive. An introduction is likely unless adequate plant quarantine restrictions are rigidly enforced in the islands and especially against importations of untreated host fruit cargoes from countries where the fruit fly presently occurs.

In the event the fruit fly becomes established in the West Indies the infestation will thus become a possible reservoir for further introductions of the insect into the United States by means of infested materials in importations of unauthorized cargo, baggage, mail, etc., as well as through stowaway mediums, including airplanes. In addition the possibility would also exist for an introduction to occur from adult flies brought by prevailing winds, as from Cuba to Florida, for example.

Recommendations

It is suggested that periodic surveys for the Mediterranean fruit fly and other possibly introduced fruit and vegetable insects be conducted at intervals of 3-4 years in representative islands of the West Indies and especially in those from which significant exports of fruits and vegetables are made to the United States such as Cuba, Jamaica, and the Dominican Republic. It also suggested that continuing individual surveys by officials of the respective islands be encouraged as much as reasonably possible.

Respectfully submitted,
R. G. Oakley

July 18, 1957

